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wherein the same error affects less than all of the array features.

57. (AMENDED) A method according to claim 10 wherein the same error affects less than all of the array features.

Remarks

The Examiner is thanked for the Office Action dated 10/23/01 (request for 2-month extension to respond, enclosed). The Examiner is also thanked for the indication of allowability of claims 49-51 and 55 if rewritten in independent form to include all the limitations of the base and any intervening claims. Accordingly, claims 49, 50, and 51 have each been rewritten to include the limitations of claim 1 on which each was previously dependent (claim 55 is dependent on claim 49). Thus, claims 49-51 and 55 should now be in condition for allowance.

Claims 8, 10, 17, 55 have also been amended to include the limitations of claim 1. Claim 17 has additionally been amended to include the head limitation, and drive pattern controlling operation of the transport limitation, from claim 10. Other of the dependent claims previously dependent upon canceled claim 1, have now been made dependent upon claim 10. None of the remaining claims provide that the at least one operating parameter is the position of the substrate which is examined by viewing the substrate.

With regard to the correction of the drawings, formal drawings were mailed to the Official Draftsperson on 01/23/02 (with the PTO date stamp of 02/20/02 on the self-addressed postcard).

Each of the Examiner's remaining rejections will now be discussed in sequence.

The Examiner first rejected claim 6 under 35 U.S.C. 112, first paragraph as lacking enablement on the basis that this claim indicates correcting of a pattern without a target pattern, and that it would not be enabling to perform a correction unless some type of target to be corrected exists. Claim 6 recites "the corrected drive pattern is derived without obtaining a target drive pattern". Claim 6 does not

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recite that there is no “target array pattern”, which is in fact referenced in parent claim 10. As pointed out on page 2, lines 27-32, the target drive pattern is that pattern which actually contains the instructions for driving the apparatus components, versus the target array pattern which is the pattern of the array to be fabricated. The corrected drive pattern (i.e. apparatus instructions) can be derived simply by taking into account the target array pattern, how the apparatus nominally operates as well as any detected error, without generating an intervening target drive pattern. This is also specifically mentioned on page 17, lines 10-16 of the present application.

Accordingly, it is believed this rejection should be withdrawn.

The Examiner next rejected claims 1-5, 7-19, 46-48, 52, 56, and 57 under 35 U.S.C. 102(a) as being anticipated by Blanchard (WO 98/41531). As mentioned above claims 1, 7, 15, 16, 18, 19, 46-48 have been canceled. This leaves under this rejection, claims 8-14, 17, 52, 56, 57. None of these remaining claims provide that the at least one operating parameter is the position of the substrate which is examined by viewing the substrate, as will now be discussed.

Turning first to claim 8, one of the distinctions between this claim and Blanchard is that claim 8 has now been amended to recite “the operating parameter is the position of the dispensing head, which is examined by viewing the dispensing head”. The Examiner references a number of portions of Blanchard relating to the position of the substrate, which position is evaluated by viewing reference marks on the substrate. See, for example, page 63, lines 4-17 referenced by the Examiner. The Examiner has not pointed to anything in Blanchard where the operating parameter is the position of the dispensing head, which is examined by viewing the dispensing head, as now required by claim 8. Accordingly, the present rejection of claim 8 (and claim 9 which is dependent thereon) should now be withdrawn. Additionally, claim 9 recites that the “operating parameter is examined by viewing a fiducial mark on the dispensing head”. The Examiner has not pointed to any such feature in Blanchard and the rejection of claim 9 should be withdrawn for this additional reason.

Similarly, one of the distinctions between claim 10 and Blanchard is that claim 10 now recites “the at least one operating parameter is the position of the substrate or dispensing head, or orientation of a nozzle, and is examined by viewing the dispensing head, or nozzle, or a droplet pattern previously dispensed from the head”.

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As pointed out above, the referenced portions of Blanchard refer only to viewing reference marks on the substrate to determine the substrate position, not to examining an operating parameter by viewing the dispensing head, or nozzle, or a droplet pattern previously dispensed from the head, as now required by claim 10. Accordingly, this rejection of claim 10 (and claims 2-6, 11-14, and 57 which are directly or indirectly dependent on claim 10) should now be withdrawn.

Additionally, note that claim 13 is further limited to being "examined by viewing the droplet pattern previously dispensed from the head". Also, claim 57 further limits the error in the operating parameter to one "wherein the same error affects less than all of the array features". The substrate displacement error disclosed in the referenced portions of Blanchard would be expected to affect all array features the same (i.e. if the substrate was displaced, all features would be expected to be displaced the same amount). For these additional reasons the rejection of these claims should now be withdrawn.

Similarly, one of the distinctions between claim 17 and Blanchard is that claim 17 now recites "and wherein the at least one parameter is a position of a nozzle which is examined by viewing the nozzle, or a droplet pattern previously dispensed from the head". As the Examiner has not pointed to any such feature in Blanchard, this rejection of claim 17 should also now be withdrawn.

With regard to claim 52, one of the distinctions between this claim and Blanchard is that claim 52 recites "the operating parameter is the position of the dispensing head, or orientation of a nozzle, and is examined by viewing the dispensing head, or nozzle". As pointed out above, the referenced portions of Blanchard do not disclose such an operating parameter and the recited way in which it is examined. Accordingly, the rejection of claim 52 should also now be withdrawn.

One of the distinctions between claim 54 and Blanchard is that claim 54 now recites "the operating parameter is the position of the dispensing head, or orientation of a nozzle, and is examined by viewing the dispensing head, or nozzle". As the Examiner has not pointed to any such feature in Blanchard, this rejection of claim 54 should also now be withdrawn.

With regard to claim 56, one of the distinctions between this claim and Blanchard is that this claim recites "wherein the same error affects less than all of the

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array features. As discussed above in connection with claim 57, the substrate displacement error disclosed in the referenced portions of Blanchard would be expected to affect all array features the same (i.e. if the substrate was displaced, all features would be expected to be displaced the same amount). Thus, as the Examiner has not pointed to the foregoing feature of claim 56 in Blanchard, the rejection of claim 56 should now be withdrawn.

If the Examiner is of the view that there are any outstanding issues, he is invited to call Gordon Stewart at (650)485-2386.

Respectfully submitted,



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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

- + (PREVIOUSLY AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:
- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
 - (b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and
 - (c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array.
2. (AMENDED) A method according to claim +10, additionally comprising operating the deposition apparatus according to the corrected drive pattern.
3. (AMENDED) A method according to claim +10 wherein the probes are DNA or RNA probes.
4. (AMENDED) A method according to claim 104 additionally comprising saving the target drive pattern in a memory of the deposition apparatus.
5. (AMENDED) A method according to claim 104 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherin the corrected drive pattern is saved in the memory.
6. (AMENDED) A method according to claim 104 wherein the corrected drive pattern is derived without obtaining a target drive pattern.

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7. ~~(PREVIOUSLY AMENDED)~~ A method according to claim 4 wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array; and
the corrected drive pattern controls operation of the transport system.

8. ~~(TWICE AMENDED)~~ A method according to claim 1-A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
- (b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and
- (c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the target drive pattern controls operation of the transport system; and

the operating parameter is the position of the substrate or dispensing head, which is examined by viewing the substrate or dispensing head.

9. ~~(AMENDED)~~ A method according to claim 8 wherein the operating parameter is examined by viewing a fiducial mark on the dispensing head or substrate.

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10. (AMENDED) A method according to claim 1—A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
- (b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and
- (c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system;

the at least one operating parameter is the position of the substrate or dispensing head, or orientation of a nozzle, and is examined by viewing the substrate, dispensing head, or nozzle, or a droplet pattern previously dispensed from the head.

11. (AMENDED) A method according to claim 47 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the corrected drive pattern is saved in the memory, prior to operating the dispensing head and transport system to form the array.

12. (AMENDED) A method according to claim 47 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the corrected drive pattern is derived by modifying, based on the detected error,

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instructions to at least one deposition apparatus component based on the target drive pattern during operation of the dispensing head and transport system to form the array.

13. (AMENDED) A method according to claim 104 wherein the at least one operating parameter is the position of the substrate in the deposition apparatus examined by viewing the droplet pattern previously dispensed from the head.

14. (AMENDED) A method according to claim 107 wherein the at least one operating parameter is a position of the dispensing head.

15. (TWICE AMENDED) A method according to claim 7 wherein the deposition apparatus further includes a position encoder to detect the position of the dispensing head or the substrate, and wherein the at least one parameter is an accuracy of the encoder to detect the position of the dispensing head or substrate.

16. (AMENDED) A method according to claim 7 wherein the at least one parameter is the accuracy of the transport system to move the substrate to an expected location in response to a command.

17. (AMENDED) A method according to claim 7 wherein the dispensing head has multiple droplet dispensing nozzles. A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

(a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;

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- (b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and
(c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system;

and wherein the at least one parameter is a position of a nozzle which is examined by viewing the nozzle, or a droplet pattern previously dispensed from the head.

+18. ~~(PREVIOUSLY AMENDED)~~ A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus and which is stored in a memory of the deposition apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

~~when an error from a nominal value exists in at least one operating parameter, which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited then deriving, based on the error, a corrected drive pattern from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and~~

~~operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array.~~

+19. A method according to claim 18 wherein the corrected drive pattern is saved in the memory.

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46. (AMENDED) A method according to claim 1 wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system; and

the at least one parameter is an accuracy of the transport system to move the substrate or head to an expected location in response to a command.

47. (AMENDED) A method according to claim 46 wherein the at least one operating parameter is an accuracy of the transport system to move the substrate or head along a corresponding nominal axis of movement.

48. (AMENDED) A method according to claim 46 wherein the at least one operating parameter is an accuracy of the transport system to move the substrate to an expected location in response to a command.

49. (AMENDED) A method according to claim 1. A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

(a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;

(b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and

(c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;

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wherein the operating parameter is a fluid volume dispensed by the deposition apparatus.

50. (AMENDED) A method according to claim 1. A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
- (b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and
- (c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;

wherein the operating parameter is a position of a component which varies due to thermal expansion.

51. (AMENDED) A method according to claim 1. A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
- (b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and
- (c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;

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whcrein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the apparatus further includes an encoder to provide data on the location of the substrate or head; and

the at least one operating parameter is an encoder error.

52. (AMENDED) A method according to claim 1—A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
- (b) when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and
- (c) operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system;

the operating parameter is the position of the dispensing head, or orientation of a nozzle, and is examined by viewing the dispensing head, or nozzle.

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55. A method according to claim 49 wherein the deposition apparatus comprises multiple jets for dispensing droplets, and wherein the corrected drive pattern comprises an instruction to switch to a different jet when a deviation from nominal volume is encountered for one jet which is more than a predetermined tolerance.

56. (AMENDED) ~~A method according to claim 1-A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:~~

- (a) ~~examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;~~
- (b) ~~when an error is detected deriving, based on the error, a corrected drive pattern different from the target drive pattern such that use of the corrected drive pattern results in a reduced discrepancy between the target and actual array patterns; and~~
- (c) ~~operating the deposition apparatus according to the corrected drive pattern so as to fabricate the array;~~

wherein the same error affects less than all of the array features.

57. (AMENDED) A method according to claim ~~10+4~~ wherein the same error affects less than all of the array features.

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